

Hepatitis A Outbreak in Anchorage, Alaska, Traced to Ice Slush Beverages

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The Alaska Department of Health and Social Services investigated a community outbreak of hepatitis A in Anchorage. A total of 57 persons who had hepatitis A between June and September 1988 were studied. Patients ranged from 1 to 54 years of age. A market was implicated as the source of the outbreak. An employee who prepared beverage mixtures in a bathroom was a contact of a person who had had hepatitis A 2 months before the outbreak; the employee was reported to have been jaundiced 3 to 4 weeks before the peak of the outbreak. The administration of immune globulin had an efficacy of 100% (95% confidence limits 69, 100%) in preventing hepatitis A among household contacts of primary cases. Similar beverages are sold by convenience markets and many other businesses nationwide. It is important to ensure that safe food-handling practices are followed by such establishments.

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In July 1988, the Alaska Department of Health and Social Services (ADHSS) investigated a hepatitis A outbreak in Peters Creek, a suburban area of Anchorage with approximately 4,000 residents. Hepatitis A is a reportable condition in Alaska, and surveillance for communicable diseases is conducted by ADHSS. From 1972 to 1985, an average of slightly less than one hepatitis A infection per week was reported in Anchorage.¹ If the incidence in Peters Creek was the same as that in the city as a whole, less than one case per year of hepatitis A would be expected.

Patients and Methods

Persons with hepatitis A were initially identified through passive reporting of confirmed and possible infections by health care professionals to ADHSS. As soon as the outbreak was recognized, a physician assistant in Peters Creek and several physicians with nearby offices were contacted and requested to report any patient(s) with hepatitis-like symptoms. There was extensive local media coverage of the outbreak, and ADHSS sent letters to all physicians in Anchorage requesting that any patient with possible hepatitis A be reported.

A primary case was defined as any instance where a Peters Creek resident or visitor had the onset of serologically confirmed hepatitis A (or, for someone living with such a person, clinical hepatitis) between June 14 and July 21, 1988. Serologic confirmation required the presence of immunoglobulin (Ig) M hepatitis A antibody (anti-HA) in serum. Clinical hepatitis was defined as either the presence of jaundice or a serum aminotransferase level of at least 2.5 times the upper limit of normal.

A secondary case was defined as any instance where a person had either serologic or clinical hepatitis A with onset of the disease 20 to 50 days after exposure to a primary case. A tertiary case was defined as any instance where a person

had either serologic or clinical hepatitis A with onset of the disease 20 to 50 days after exposure to a secondary case.

Serologic testing for IgM anti-HA and total anti-HA was done by private laboratories or the Alaska State Public Health Laboratory using commercial enzyme immunoassay kits. Family members of infected patients were given standard doses (0.02 to 0.04 ml per kg of body weight) of commercially obtained immune globulin by their health care providers or the Anchorage Department of Health and Human Services (HHS).

A case-control study to examine possible causes of the outbreak was conducted by comparing primary cases with family members who were either asymptomatic or seronegative for total anti-HA or IgM anti-HA. The first 14 people with reported cases and all 22 of their household contacts were interviewed by a public health nurse or physician and questioned extensively about social events, restaurant meals, grocery shopping, travel, and other community activities. Although they were not included in the case-control study, the 18 remaining people with primary cases, as well as those with secondary and tertiary cases, were also interviewed.

The efficacy of immune globulin in preventing secondary infection was calculated using the following formula:

$$\text{Efficacy} = (1 - \text{OR}) \times 100\%$$

where OR is the odds ratio.² The odds ratio was calculated from the number of secondary cases among household contacts who had and had not received immune globulin. Confidence limits were calculated using the exact method.³

Environmental Investigation

Public and private water supplies in Peters Creek were tested for total and fecal coliform levels by HHS and the Alaska Department of Environmental Conservation. A mar-

ABBREVIATIONS USED IN TEXT

ADHSS = Alaska Department of Health and Social Services
 anti-HA = hepatitis A antibody
 CL = confidence limits
 HHS = Anchorage Department of Health and Human Services
 Ig = immunoglobulin
 OR = odds ratio

ket implicated as the source of the outbreak was inspected by HHS, and ADHSS conducted an investigation of its employees.

Results

A total of 32 primary, 23 secondary, and 2 tertiary cases were reported in this outbreak (Figure 1). Of these, 53 patients were IgM anti-HA-positive; the other 4 patients did not have serologic testing but met the clinical case definition. Overall, the median age of patients was 18.0 years (range 1 to 54 years), and 31 (54%) were female. Information regarding symptoms was not systematically collected; however, of 37 patients for whom complete information was available, 29 (78%) had jaundice, 11 (30%) had vomiting, and 11 (30%) had fever or chills (Table 1). Three persons were briefly admitted to hospital; there were no deaths.

Among the 23 secondary cases, 14 persons (61%) were household members of people with primary cases, 7 (30%) were visitors to primary-case households, and 2 (9%) were infected by a person with a primary case who was a cook at a social event. Both people with tertiary infection resided with people who had secondary infection. The median age of secondary and tertiary cases was 25.0 years, older than that

of primary cases, which was 13.0 years (Wilcoxon rank sum $P = .042$).

Case-Control Study

No common social events, restaurants, or community activities were identified. The 14 persons classified as primary cases, however, had consumed at least one ice slush beverage purchased from a Peters Creek convenience market (market A) between May 23 and June 10, 1988. This interval

TABLE 1.—Symptoms of Hepatitis A in 37 Persons, Anchorage, Alaska, 1988

| Symptom | Persons With Symptom | |
|----------------------|----------------------|------|
| | No. | (%) |
| Jaundice..... | 29 | (78) |
| Fever or chills..... | 11 | (30) |
| Vomiting..... | 11 | (30) |
| Abdominal pain..... | 7 | (19) |
| Diarrhea..... | 4 | (11) |
| Anorexia..... | 4 | (11) |
| None..... | 1 | (3) |

was identified because few persons were able to recall the specific day on which they had consumed an ice slush beverage. Of the 22 asymptomatic or anti-HA-negative household members (controls), 7 had consumed an ice slush beverage during this interval. The association between the consumption of an ice slush beverage purchased from market A and infection with hepatitis A was significant (OR = ∞ ; 95% confidence limits [CL] 4.9, ∞). All 18 patients with primary

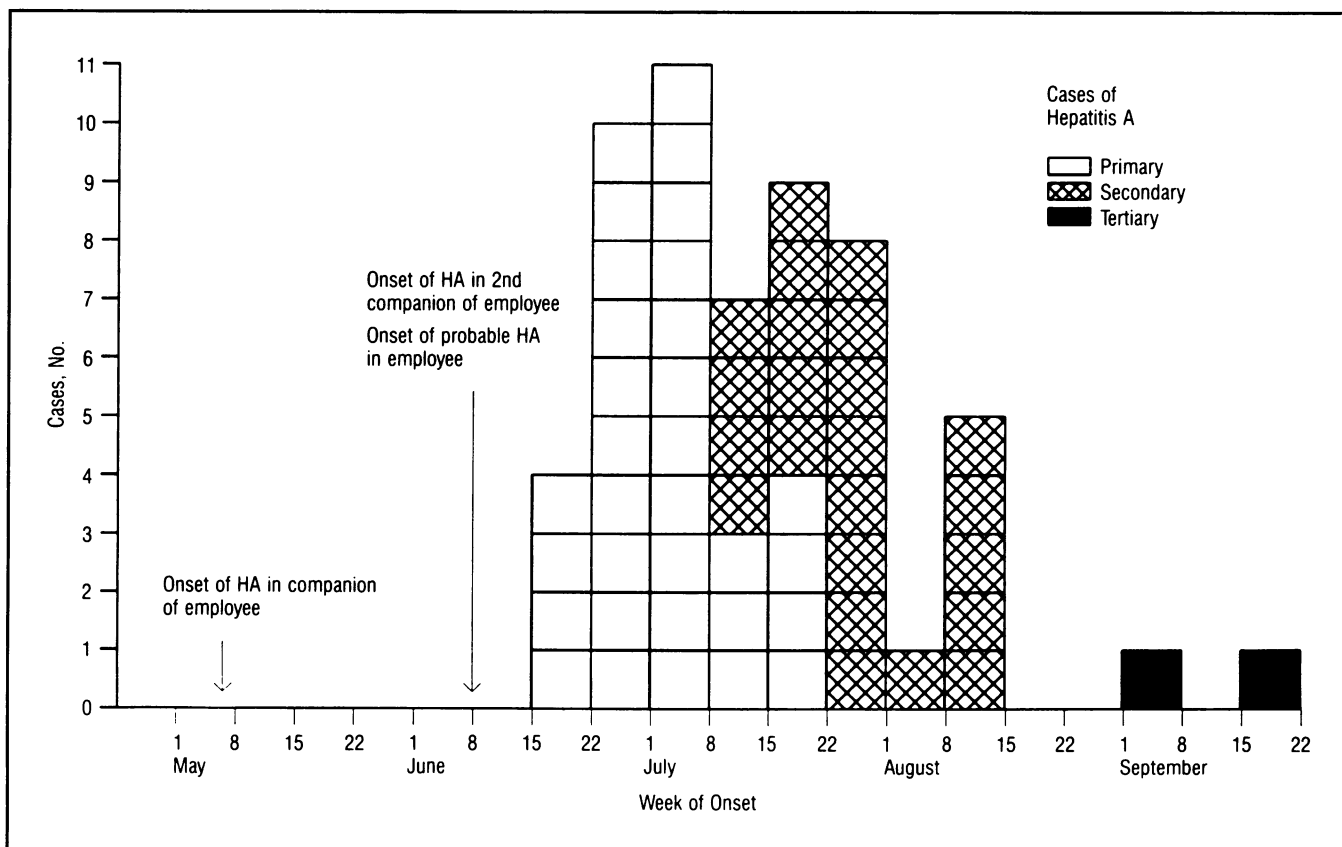


Figure 1.—Reported cases of hepatitis A (HA) are depicted by week of onset for the outbreak in Peters Creek, Alaska, from May to September 1988.

infection not included in the case-control study also had had this exposure.

Efficacy of Immune Globulin Prophylaxis

The 32 persons with primary infection had 64 household contacts who were initially asymptomatic. Among these persons, 14 secondary cases resulted, for a secondary attack rate of 22%. Information on immune globulin administration was available for 52 (81%) of the household contacts. These contacts resided in households in which either *all* contacts were given immune globulin ($n = 8$) or *none* were given immune globulin ($n = 9$). Of 22 contacts who received immune globulin within two weeks of diagnosis of the primary case in their household, none subsequently became ill, compared with 13 secondary cases among the 30 contacts who were not treated (efficacy = 100%, 95% CL 69, 100%).

Among the 12 household contacts with unknown immune globulin status, 1 secondary case was identified. Assuming that this person had received immune globulin and the 11 other contacts had not, the immune globulin efficacy is 90% (95% CL 23, 100%).

The median age of the contacts who received immune globulin (23.5 years) was not significantly different from that of contacts who did not (22.0 years; Wilcoxon rank sum $P = .32$).

Environmental Investigation

Water samples were collected from market A, a community well serving at least 60 homes in Peters Creek, a private well that supplied water to several case households, and taps from four individual case households. All samples had total and fecal coliform counts in the acceptable range for safe drinking water and consistent with uncontaminated water supplies.

Two employees of market A were responsible for preparing a mixture used to fill a freezer that dispensed ice slush beverages. They prepared the mixture by adding approximately 630 ml of a commercial liquid concentrate (containing sugar, flavoring, and other ingredients) to an empty 1-gallon (3.79-liter) bottle. The bottle was then filled with water from a bathroom sink and kept in a refrigerator until needed. Mixing utensils were stored next to a toilet in a back room of the market. From one to six bottles of mixture were prepared daily.

Beverages were dispensed from the freezer to customers. Employees had no contact either with the mixture when the freezer was filled or with ice slush when beverages were dispensed. The freezer was not regularly cleaned, and the market did not keep cleaning or maintenance records.

In mid-July, four of the five employees of market A underwent serologic testing for hepatitis A. All four were IgM anti-HA-negative. The fifth employee, one of the two persons who prepared beverage mixture, refused to be tested. This employee had two companions who had had laboratory-confirmed hepatitis A during the two months before the outbreak. The first was a 23-year-old woman with illness onset on May 5 (Figure 1). The other, her 21-year-old sister, became jaundiced on June 8. These three people had been together during the week of May 5, and although the employee denied illness, one of his companions said he was jaundiced during the first week of June.

On July 14, HHS ordered the market to stop selling all ice slush beverages. Conditions under which sales could re-

sume, the most important being acceptable beverage preparation procedures, were specified by HHS. The market elected to permanently discontinue selling ice slush beverages.

Discussion

This investigation implicated ice slush beverages sold by a convenience market as the vehicle for a hepatitis A outbreak. Both the case-control study and the inspection and investigation at market A supported this conclusion. Because the peak of the outbreak occurred approximately 60 days after an employee who prepared the beverage mixture had had exposure to hepatitis A (and, according to a companion of the employee, approximately 30 days after the employee was jaundiced), it is likely that the employee was the source of the outbreak.

Although one published hepatitis A outbreak investigation reported a household secondary attack rate of 0%,⁴ most outbreaks have secondary attack rates of between 5% and 12%.⁵⁻¹⁰ Selection bias may have contributed to the relatively high rate observed here (22%) because primary cases may have been more completely ascertained in households with secondary transmission; several persons with primary infection and with mild or moderate symptoms were identified only after medical care was sought for secondarily infected household members.

The analysis of immune globulin efficacy is reassuring even though the data, like those from most field investigations, are incomplete. Among household contacts who were given immune globulin within two weeks of diagnosis of the primary case, there were no secondary cases. This observation, coupled with the occurrence of 13 secondary cases among 30 household members who were not given immune globulin, strongly supports the use of immune globulin as currently recommended.¹¹ Because household contacts were not consistently tested for anti-HA, some may have been immune. All household contacts of each person with primary infection either received or did not receive immune globulin; thus, it was not possible to distinguish between the effectiveness of immune globulin and a possible household effect. Because Peters Creek is a relatively homogeneous community in which most households are of similar size and socioeconomic status, it is unlikely that the observed effectiveness of immune globulin was due to household differences in immunity, cleanliness, food handling, or other factors.

This outbreak points out the importance of proper food-handling practices. Common-source hepatitis A outbreaks are uncommon in the United States: In 1987, there were 25,280 reported cases of hepatitis A, but only 9 confirmed food-borne hepatitis A outbreaks (involving 187 persons) reported to the US Centers for Disease Control.^{12,13} If food handlers adhered to recommended food handling and hygienic practices, these outbreaks might be prevented. The procedures used by the market to prepare the beverage mixture were clearly unacceptable. The ice slush beverage implicated in this outbreak, and other beverages requiring mixing, are often sold by convenience markets, gasoline stations, movie theaters, and other establishments; this investigation highlights the potential for the transmission of hepatitis A and other enteric diseases at such businesses. If employees follow proper food-handling techniques and observe good personal hygiene practices, especially hand washing, the risk of disease transmission can be substantially reduced.

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TWELVE WORDS

I even dream of calling you,
to discuss my options, as it were,

to ask if the pain in the shoulder
is related to the mass in the neck

which seems less swollen, even though
it occurred just after the drugs

which may have caused the nausea
and certainly precipitated the weight loss,

(not that I had any leeway),
unlike the hair loss, which I agree

is merely vanity in a man my age,
but it focused on the tracheostomy

which I press with my thumb to speak, but,
I'm never understood, and yet,

only you come by and talk to me
without shouting as others do,

suggesting that I am also deaf,
(which I am certainly not),

so that I must respond by writing
on this yellow pad in bold script

knowing that your time is valuable
needing to see many people,

so I have promised to limit myself
to twelve words each day.

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TWELVE MORE WORDS

I even celebrated your speechless valor,
drill sergeant for 20 years,

screaming with fine-tuned cords,
“eyes forward, chin up, follow orders,”

which you never did, drinking
gallons of beer, smoking ceaselessly,

until those cords were cut out,
already covered with cancer cells,

finding their way relentlessly around
until you were 104 pounds

of quiet fire, reduced to writing notes
on a little yellow pad with a cheap pencil

without ever complaining about the nausea,
the mouth sores, the hair loss,

because we had a pact,
when the mass was gone,

a pact I commemorated in a poem
called *Twelve Words*—that you

wouldn't wait 3 days until
your kidneys stopped, your gut bled,

your lungs filled with fluid, so
I have only 12 more words:

Austin, you son of a bitch,
did you have to die today!

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